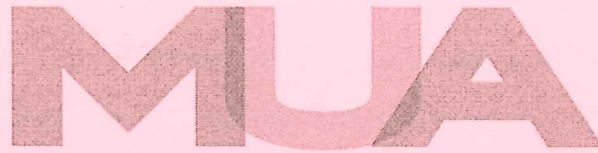


The
Management
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UNDERGRADUATE UNIVERSITY EXAMINATIONS

SCHOOL OF MANAGEMENT AND LEADERSHIP

**DEGREE OF BACHELOR OF MANAGEMENT AND LEADERSHIP/
BACHELOR OF COMMERCE**

BML 103/ BCM 112 : BUSINESS MATHEMATICS

DATE: 2ND AUGUST 2023

DURATION: 2 HOURS

MAXIMUM MARKS: 70

INSTRUCTIONS:

1. Write your registration number on the answer booklet.
2. **DO NOT** write on this question paper.
3. This paper contains **SIX (6)** questions.
4. Question **ONE** is compulsory.
5. Answer any other **THREE** questions.
6. Question **ONE** carries **25 MARKS** and the rest carry **15 MARKS** each.
7. **Write all your answers in the Examination answer booklet provided.**

QUESTION ONE

- a) Explain the purpose of Venn diagrams (1 Mark)
- b) Suppose you are given the data below relating to sales of an insurance policies by sales representative at LIONs Insurance company:
202,314,152,201,313,295,233,129.
Calculate the standard deviation. (6 Marks)
- c) Find the nature of the turning point of the curve: $C=3Q^3 + 2Q^2 - 10Q + 100$ (6 Marks)
- d) Using a diagramme, explain two types of Skewness (3 Marks)
- e) Differentiate between the following concepts:
- i. Mutually exclusive events and independent events (2 Marks)
 - ii. Discounting and annuity (2 Marks)
- f) Given that:

$$A = \begin{Bmatrix} 3 & 9 \\ -4 & 2 \end{Bmatrix} \quad B = \begin{Bmatrix} 5 & 12 \\ 7 & -2 \end{Bmatrix}$$
 Find: $\{AB\}^{-1}$ (5 Marks)

QUESTION TWO

- a) Evaluate $\int_2^4 (2x^2 + 3x^3 + x + 16)dx$ (6 Marks)
- b) Giving examples in each case, explain any three approaches in defining probability (9 Marks)

QUESTION THREE

- a) The following table shows the distribution of 105 families according to their expenditure per week. Number of families corresponding to the expenditure's groups sh. (10 - 20) and sh. (30 -40) are missing from the table. The Median for the distribution is sh. 25.

Expenditure (in Sh.)	No of Families
0-10	14
10-20	?
20-30	27
30-40	?
40-50	15

Using the data calculates the missing frequencies and coefficient of variance

(11 marks)

- b) In a class of 100 students, 45 like accounting units and 55 like finance units. 10 like both. Illustrate in an appropriate diagram and determine how many like neither the unit

(4 Marks)

QUESTION FOUR

- a) Among a group of students, 50 played cricket, 50 played hockey and 40 played volley ball. 15 played both cricket and hockey, 20 played both hockey and volley ball, 15 played cricket and volley ball and 10 played all three. If every student played at least one game, find the number of students and how many played only cricket, only hockey and only volley ball? (10 Marks)
- b) You are provided with the following information regarding the Kenyan economy for the years 2017 to 2021 in relation to prices of cooking oil

Period (Years)	2017	2018	2019	2020	2021
Price of Cooking Oil (Ksh.)	120	150	220	190	180

Required:

Obtain the price relatives

(5 Marks)

QUESTION FIVE

- a) How much amount is required to be invested every year so as to accumulate to Ksh. 6,000,000 at the end of 10 years, if interest is compounded annually at 10% rate of interest. **(3 Marks)**

b) Given: $3 \begin{Bmatrix} a & b \\ d & c \end{Bmatrix} = \begin{Bmatrix} a & 10 \\ -4 & 2c \end{Bmatrix} + \begin{Bmatrix} 6 & a+b \\ d+c & 11 \end{Bmatrix}$

Find the values of the variables

(8 Marks)

- c) Explain two methods of constructing the simple index number **(4 Marks)**

QUESTION SIX

- a) Solve the following simultaneous equation using the Cramer's Rule

$$4X + 9Y - Z = 100$$

$$6X - 2Y - 5Z = 140$$

$$3Y + X + 2Z = 110$$

(9 Marks)

- b) Explain any six probability methods of sampling that can be used in research **(6 Marks)**

BML 103/ BCM 112: BUSINESS MATHEMATICS - FORMULAS

$$\text{Mean} = \frac{\sum X}{n}$$

$$\text{Mean,} = \frac{\sum FX}{\sum F}$$

$$\text{Z-Formula} = \frac{\text{Mean Value}}{\text{standard deviation}}$$

$$\text{Mode} = L + (F1 - f0)/(2F1 - f0 - F2) \times i \quad \text{or} \quad \text{Mode} = L + \left(\frac{D_1}{D_1 + D_2} \right) \cdot c$$

$$\text{Median} = L + \frac{i}{F} (m - c) \quad \text{or} \quad \text{Median} = L + \left(\frac{\frac{N}{2} - F_{m-1}}{f_m} \right) \cdot c$$

$$\text{Variance} = \frac{\sum F(X - \text{mean})^2}{\sum F} \quad \text{or} \quad \text{Variance, } S^2 = \frac{\sum fx^2}{\sum f} - \bar{x}^2$$

$$\text{Standard deviation} = \sqrt{\frac{\sum F(x - \text{mean})^2}{\sum F}} \quad \text{or}$$

$$\text{Standard deviation, } S = \sqrt{\frac{\sum fx^2}{\sum f} - \bar{x}^2}$$

$$\text{CV} = \frac{\text{SD}}{\text{Mean}} \times 100$$

$$\text{SKp} = 3 \times \frac{(\text{mean} - \text{median})}{\text{Standard deviation}}$$

$$S = P(1 + r n)$$

$$S = P(1 + r)^n$$

$$L_P = \frac{\sum q_0 p_n}{\sum q_0 p_0} \times 100$$

$$L_Q = \frac{\sum p_0 q_n}{\sum p_0 q_0} \times 100$$

$$P_P = \frac{\sum q_n p_n}{\sum q_n p_0} \times 100$$

$$P_Q = \frac{\sum p_n q_n}{\sum p_n q_0} \times 100$$

$$F_P = \sqrt{L_P \times P_P}$$

$$F_Q = \sqrt{L_Q \times P_Q}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

